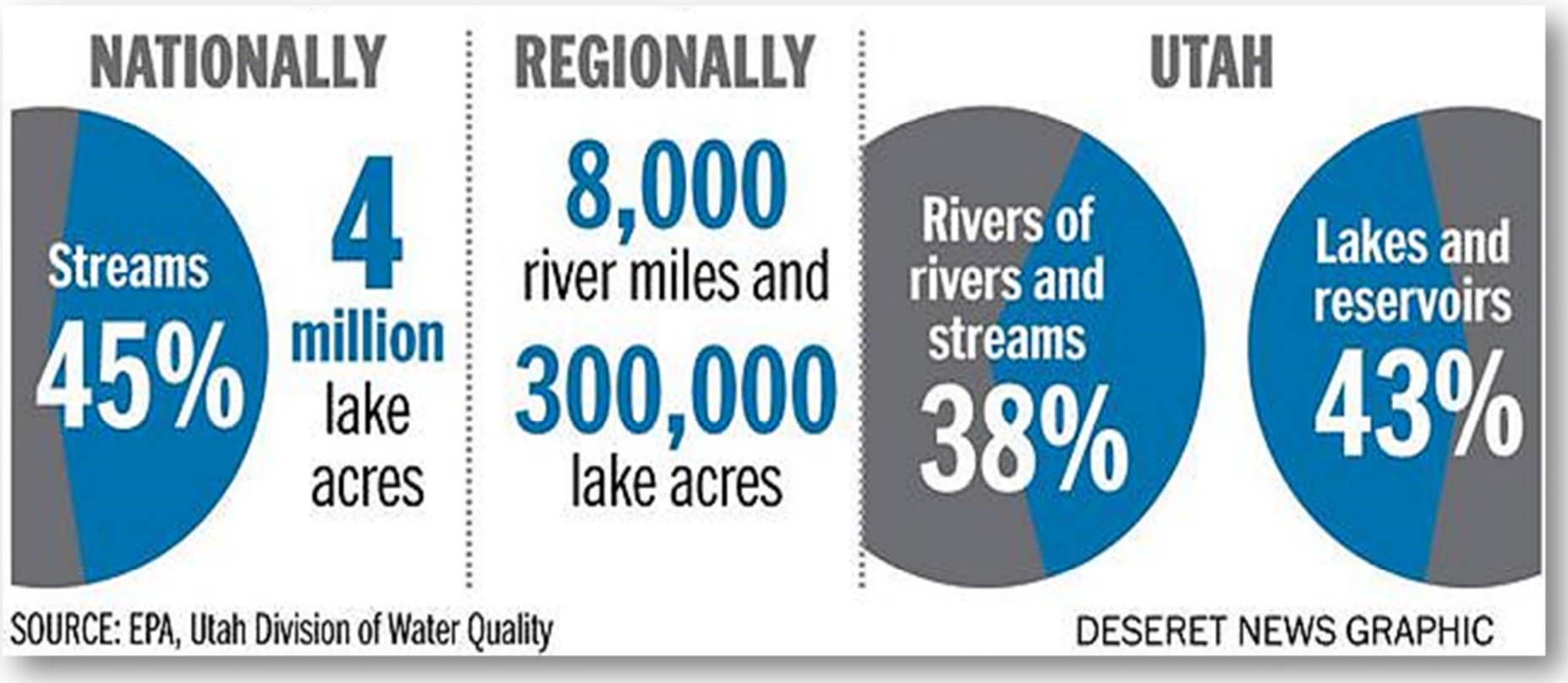
WHY DO WE NEED A NEW SEWER TREATMENT PLANT?

Nutrient Pollution Impacts Utah's Rivers and Lakes



Pollution in Utah Lake from Excess Nutrients

Picture Courtesy of Utah County Health Department

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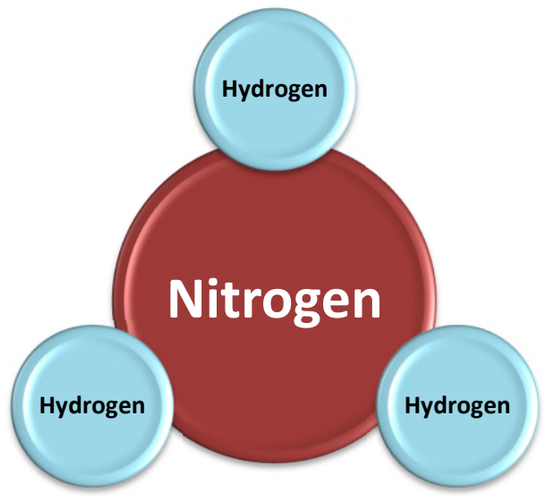
NEW LIMITS PASSED TO HELP MITIGATE NUTRIENT IMPACTS

❖ New Chronic Ammonia Rule Established by EPA

- 2008 – Utah DEQ Adopts EPA Chronic Ammonia Rule
- **Must Meet New Discharge Limits by August, 2022**
- Current Limit: 23.0 mg/L daily max.
- Reduced Limits: 1.5 mg/L monthly avg.
  5.0 mg/L daily max.



❖ New Phosphorus Rule Adopted by Utah DEQ in 2015

- **DEQ Adopts a Rule that ALL Lagoon Based Treatment Works Discharge a Maximum of 125% of Baseline Effluent Load**
  - **Once 125% Cap is Exceeded the Facility will have 5-years to Construct Treatment Processes to Prevent Exceeding Cap**
- **Must Meet New Lagoon Discharge Limits by January, 2020**
- **DEQ Adopts a Rule that ALL Non-Lagoon Wastewater Treatment Works in Utah Reduce Phosphorus Discharge to 1.0 mg/L Annual Average**

❖ Future Changes to Additional Discharge Limits

- **Potential Future Ammonia Limits of 0.5 mg/L (monthly avg.)**
- **Potential New Nitrogen Limits**
  - ➢ **Statewide Total Inorganic Nitrogen Limit of 10 mg/L**
  - ➢ **Compliance Schedule: Expected around 2025**
- **Utah Lake TMDL (Total Maximum Daily Load)**
  - ➢ **Potential Lower Limit for Phosphorus Discharge**
  - ➢ **Potential New Limit for Total Dissolved Solids**

Picture Courtesy of randomwallpapers.net

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WHAT DO NEW LIMITS MEAN TO SALEM CITY?

❖ Ammonia Discharge Limits

	Previous Permit	*2015 Average Daily Discharge	**New Permit**
Monthly Avg. (mg/L)	--	11.5	**1.5**
Daily Max.(mg/L)	23.0	18.6	**5.0**

- ➢ **Existing Lagoons Do Not Meet Limits During Winter Months**
- ➢ **As Future Flow/Loads Increase, Lagoons will Continue to Exceed Limits**

Compliance Schedule Established by DEQ to Meet Ammonia Limit

- **August 1, 2016:** Salem shall submit Wastewater Master Plan to DEQ with recommended improvements
- **February 1, 2018:** Salem shall submit plans for construction to DEQ
- **February 1, 2019:** Salem shall commence construction of DEQ approved wastewater treatment upgrades
- **August 1, 2021:** Salem shall complete construction of WWTP upgrades and commence start-up
- **August 1, 2022:** Salem shall achieve compliance with all effluent limits in discharge permit, including ammonia

❖ Total Phosphorus Discharge Limits

	Previous Permit	*2015 Discharge	New Permit
Annual Avg. (mg/L)	None	3.6 (Avg. Day)	1.0
Annual Max. (mg/L)	None	4.8 (Max. Day)	125% of Avg. Day

- ➢ **Existing Lagoons are Expected to Exceed 125% Cap by 2025**
- ➢ **Existing Lagoons WILL NOT Meet 1.0 mg/L Phosphorus Limit**

Compliance Schedule Established by DEQ to Meet Phosphorus Limit

- **July 2015:** Salem shall begin monitoring to set baseline of effluent phosphorus
- **January 2020:** Salem shall meet effluent phosphorus limit established by DEQ

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EXISTING LAGOON ALTERNATIVES

❖ Extend the Life of Existing Lagoon System

- **Ammonia**
  - Possible attached growth, but can't consistently meet 1.5 mg/L limit
- **Phosphorus**
  - Requires chemical addition, leading to increased operational costs
- **BOD/TSS**
  - Add filters onto lagoons, but algae growth in lagoons can clog filters
- **Total Nitrogen**
  - Can't address with lagoons
- **Utah Lake TMDL**
  - Can't address with lagoons

❖ Complete Lagoon Upgrades

Estimated Life Cycle Costs

Alt.	Description	Capital Cost	Annual O&M Cost	*NPV of O&M Cost	Total Life Cycle Cost
2A	Lagoon Upgrade (EDI IDEAL)	$13,212,000	$351,000	$5,700,000	**$18,912,000**
2B	Lagoon Upgrade (Nelson SAGR)	$22,726,000	$559,000	$9,100,000	**$31,826,000**

*NPV assumes 20-year period @ 2% discount rate

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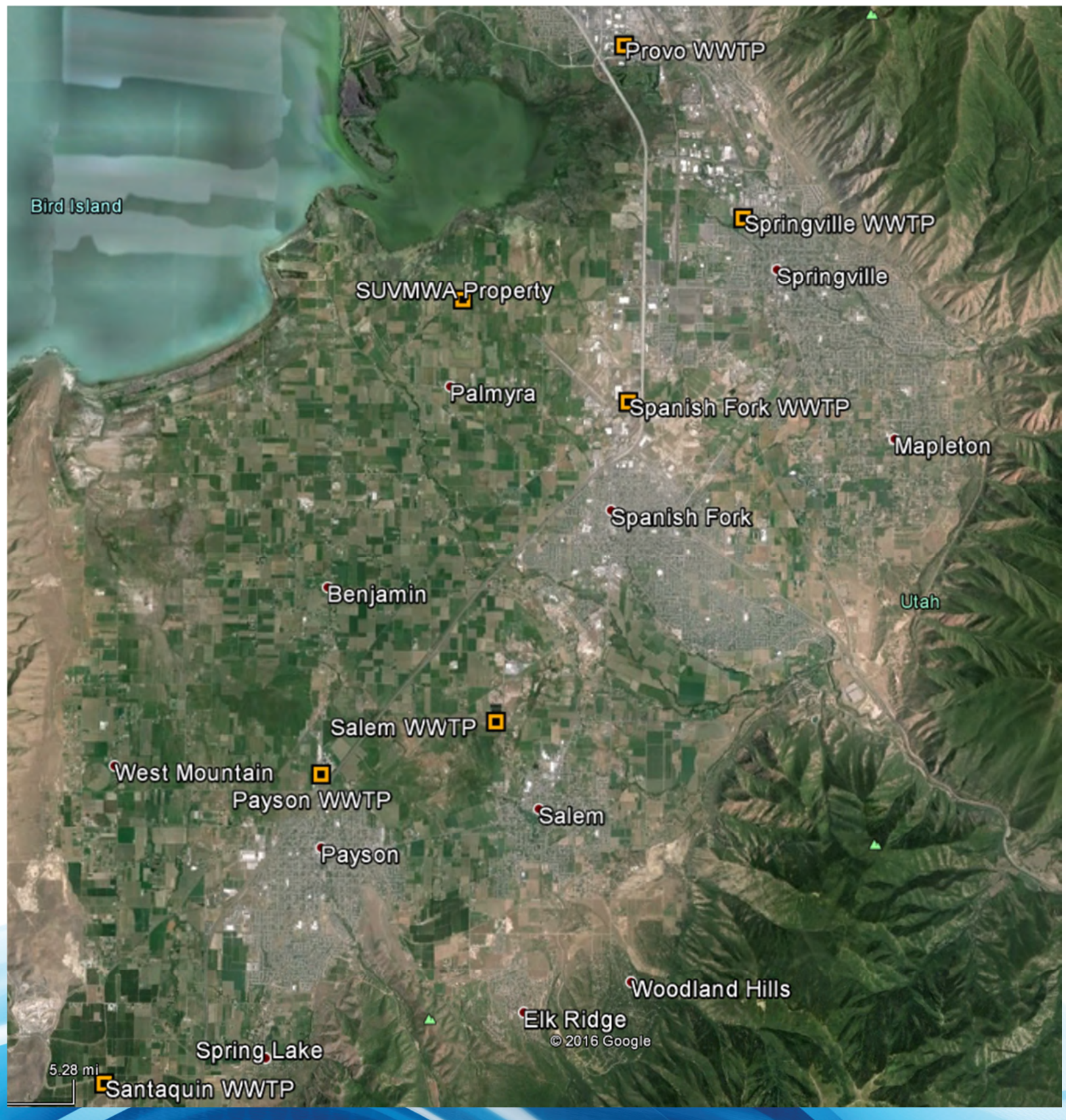
REGIONAL ALTERNATIVES

❖ Regional Treatment System with Neighboring Cities

- **Salem / Payson / Spanish Fork Alternatives**
  - **Alt. 1: Develop Wastewater Treatment Plant at SUVMWA Property**
  - **Alt. 2: Expand Spanish Fork WWTP, Convey Salem & Payson Wastewater to Spanish Fork**
  - **Alt. 3: New Regional WWTP, Convey Salem, Payson, & Spanish Fork Wastewater to New Plant**

- **Salem / Payson Alternatives**
  - **Alt. 4: Expand Payson WWTP, Convey Salem Wastewater to Payson**
  - **Alt. 5: New Regional WWTP for Salem & Payson**

- **Salem / Spanish Fork Alternatives**
  - **Alt. 6: Expand Spanish Fork WWTP, Convey Salem Wastewater to Spanish Fork**
  - **Alt. 7: New Regional WWTP for Salem**



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REGIONAL ALTERNATIVES

❖ Regional Treatment System with Neighboring Cities

ESTIMATED USER RATE ANALYSIS

	Baseline: New Salem WWTP	Alt. 4: Expand Payson WWTP	Alt. 6: Expand SF WWTP
2020 PROJECT			
Rate Increase			
Project Cost	$14,000,000	$13,600,000	$12,100,000
City Match	$1,000,000	$1,000,000	$3,000,000
Loan Amount	$13,000,000	$12,600,000	$9,100,000
Term (years)	20	20	20
Interest Rate	1.500%	1.500%	2.500%
Annual Payment	$757,000	$734,000	$584,000
Projected ERUs for Year 2020	2,818	2,818	2,818
Increase per ERU	$22.39	$21.71	$17.27
Calculation of New Rate			
Salem Collection/Admin	$20.00	$20.00	$22.00
Treatment	$12.00	$15.00	$10.00
Debt Service	$22.39	$21.71	$17.27
New Rate	**$54.39**	**$56.71**	**$49.27**
2030 PROJECT			
Rate Increase in 2030			
Project Cost			$3,000,000
City Match			$0
Loan Amount			$3,000,000
Term (years)			20
Interest Rate			2.500%
Annual Payment			$192,000
Projected ERUs for Year 2030			4,171
Increase per ERU			$3.84
Calculation of New Rate			
New Rate	**$54.39**	**$56.71**	**$53.11**

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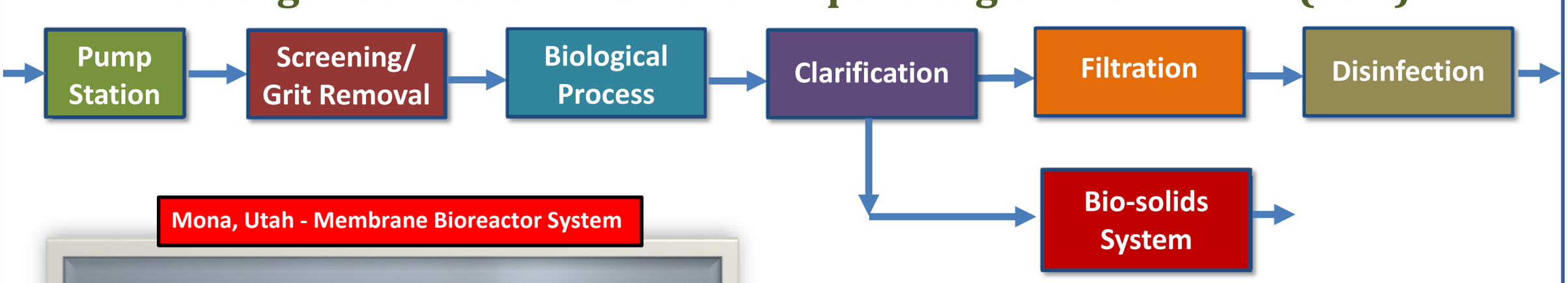
SALEM WWTP ALTERNATIVES

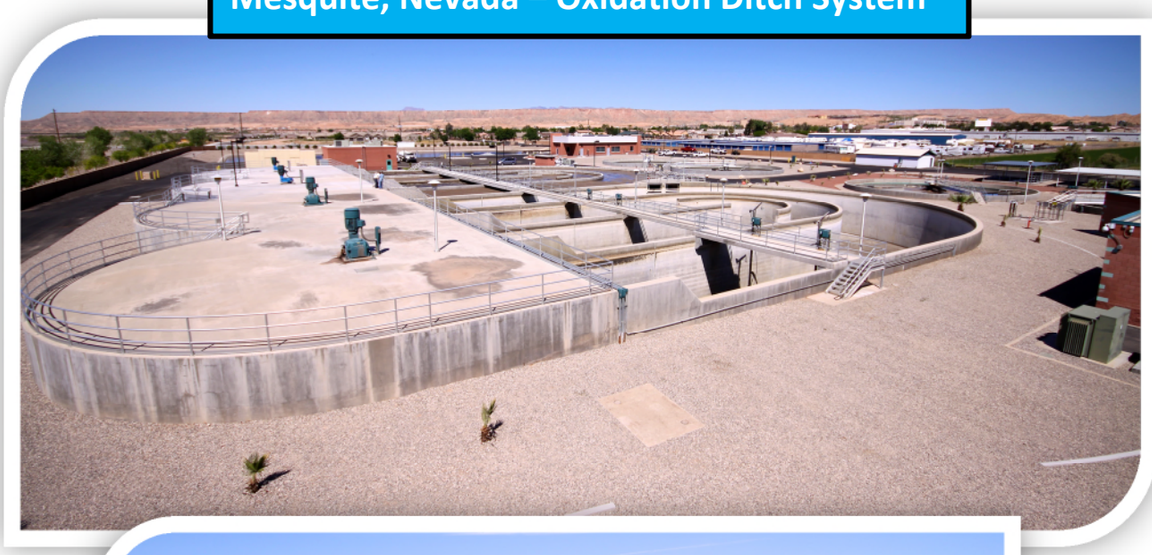
❖ Mechanical Treatment Systems

- ➢ Biological Nutrient Removal - Oxidation Ditch System
- ➢ Biological Nutrient Removal - Activated Sludge
- ➢ Biological Nutrient Removal - Membrane Bioreactor (MBR)
- ➢ Biological Nutrient Removal - Sequencing Batch Reactor (SBR)



Mona, Utah - Membrane Bioreactor System

Mesquite, Nevada – Oxidation Ditch System



Burley, Idaho – Activated Sludge System

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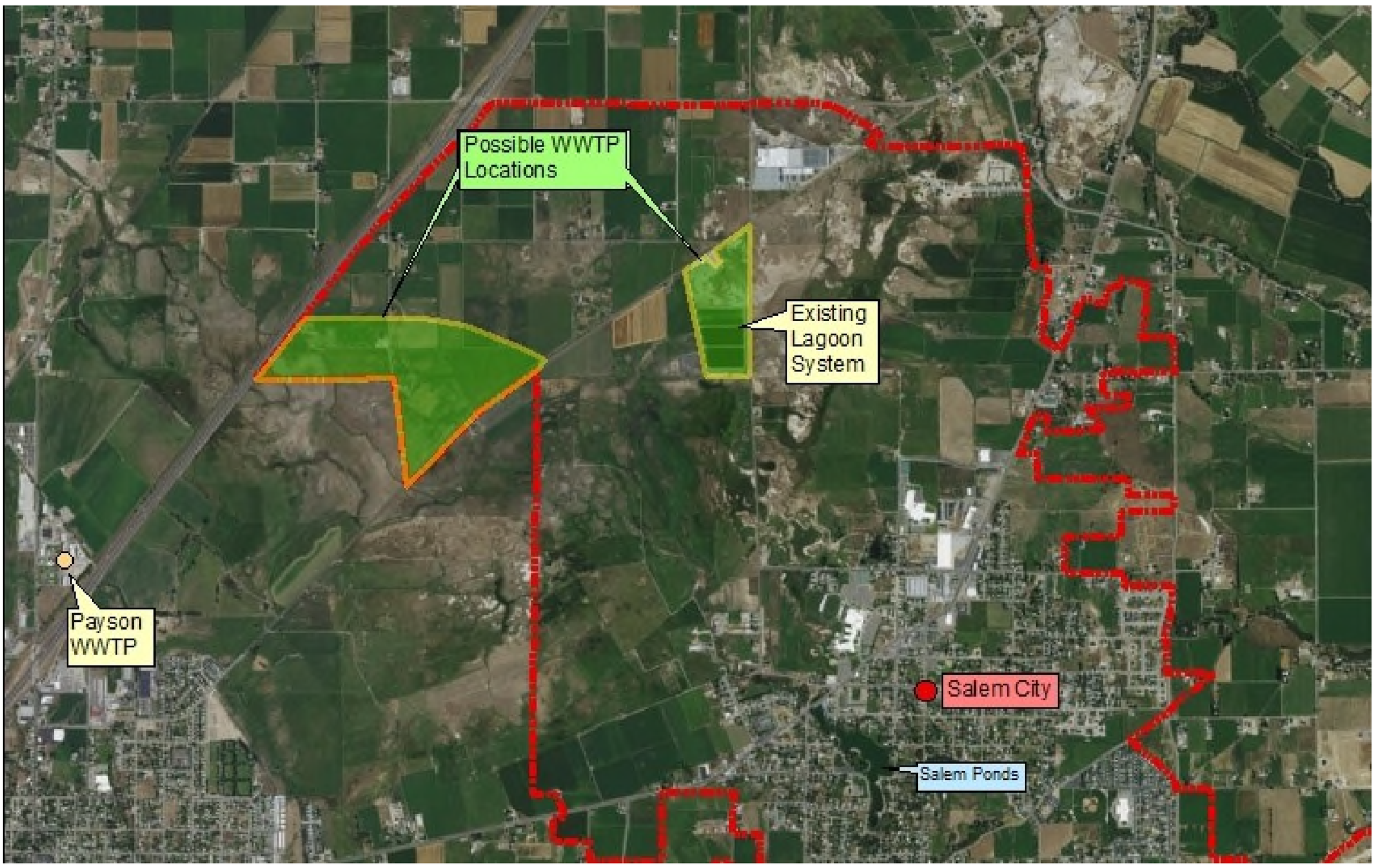
SALEM WWTP ALTERNATIVES

❖ Possible New WWTP Site Locations



❖ Estimated Life Cycle Costs

Alt.	Description	Capital Cost	Annual O&M Cost	*NPV of O&M Cost	Total Life Cycle Cost
3	Oxidation Ditch	$14,000,000	$507,000	$8,300,000	**$22,300,000**
4	Activated Sludge BNR	$15,302,000	$493,000	$8,100,000	**$23,402,000**
5	Membrane Bioreactor BNR	$19,018,000	$622,000	$10,200,000	**$29,218,000**
6	Sequencing Batch Reactor BNR	$13,391,000	$507,000	$8,300,000	**$21,691,000**

*NPV assumes 20-year period @ 2% discount rate

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ALTERNATIVE SELECTION

Selection Criteria	Weight Value	Alternative 1 Do Nothing		Alternative 2 Lagoon Based System		Alternative 3 Oxidation Ditch System	
		Selection Value	Total Value	Selection Value	Total Value	Selection Value	Total Value
Capital Cost	**5**	2	10	2	10	1	5
O&M Cost	**5**	2	10	2	10	1	5
Process Stability	**4**	-2	-8	-1	-4	1	4
Space Requirements	**3**	0	0	0	0	1	3
Process Flexibility	**4**	-2	-8	-2	-8	1	4
Process Complexity	**4**	2	8	1	4	1	4
Effluent Disposal	**4**	-2	-8	0	0	1	4
Power Requirements	**3**	2	6	1	3	0	0
Sludge Production	**3**	2	6	1	3	0	0
Expandability	**2**	-2	-4	0	0	2	4
Public Perception	**2**	0	0	0	0	1	2
Totals			**12**		**18**		**35**

Selection Criteria	Weight Value	Alternative 4 BNR Activated Sludge System		Alternative 5 MBR System		Alternative 6 SBR System	
		Selection Value	Total Value	Selection Value	Total Value	Selection Value	Total Value
Capital Cost	**5**	0	0	-1	-5	1	5
O&M Cost	**5**	1	5	-1	-5	1	5
Process Stability	**4**	1	4	2	8	0	0
Space Requirements	**3**	1	3	2	6	1	3
Process Flexibility	**4**	2	8	2	8	1	4
Process Complexity	**4**	0	0	-1	-4	-1	-4
Effluent Disposal	**4**	1	4	2	8	1	4
Power Requirements	**3**	0	0	-1	-3	0	0
Sludge Production	**3**	0	0	0	0	0	0
Expandability	**2**	2	4	2	4	2	4
Public Perception	**2**	1	2	2	4	1	2
Totals			**30**		**21**		**23**

LEGEND	
Weight Value	Selection Value
1 - Minimal Importance	+2 Significant beneficial impact to owner
2 - ↓	+1 Minimal beneficial impact to owner
3 - Important	0 No impact to owner
4 - ↓	-1 Minimal negative impact to owner
5 - Very Important	-2 Significant negative impact to owner

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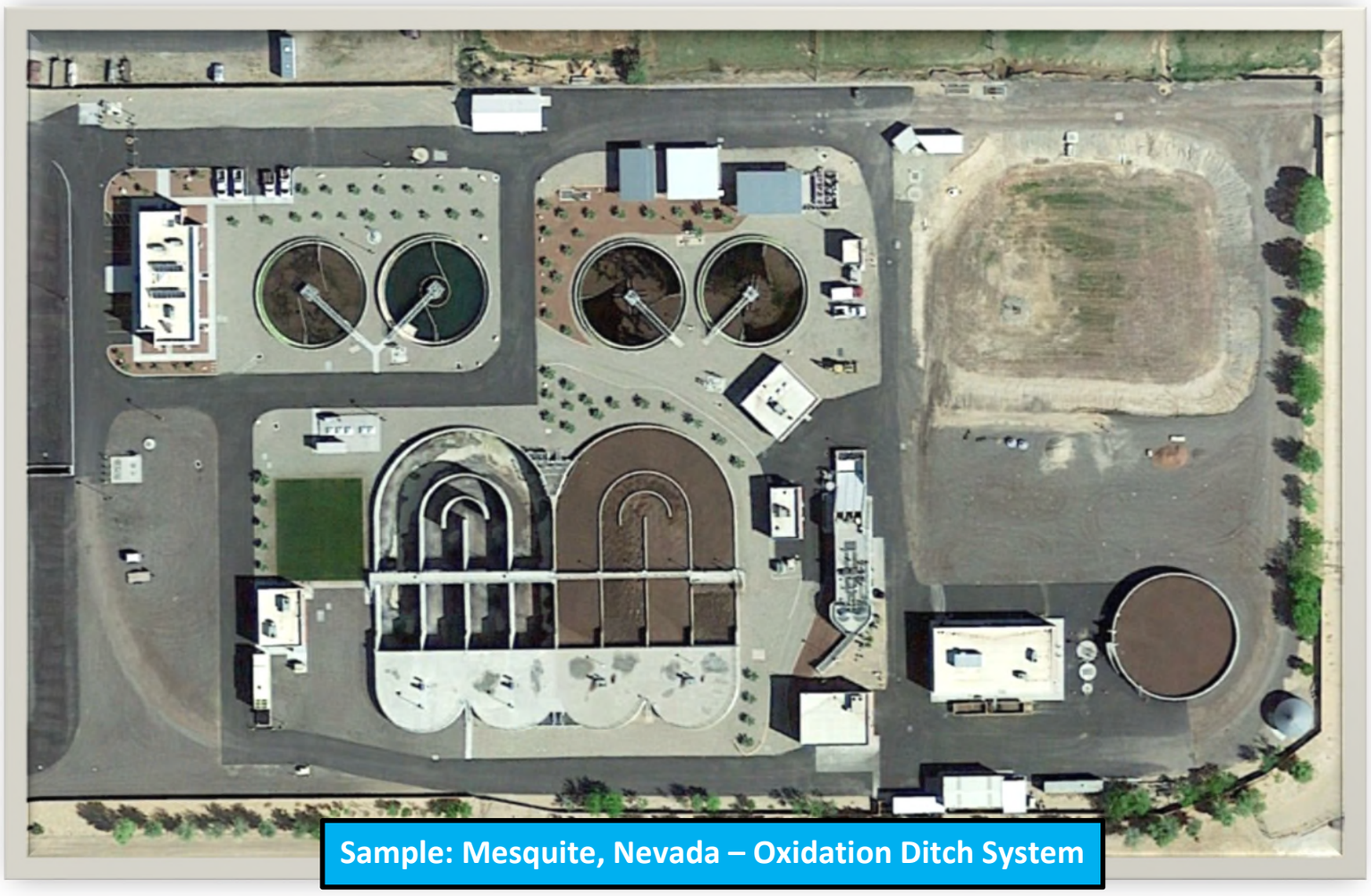
City of SALEM

RECOMMENDED ALTERNATIVE

BIOLOGICAL NUTRIENT REMOVAL - OXIDATION DITCH SYSTEM



Sample: Mesquite, Nevada – Oxidation Ditch System

ESTIMATED PROJECT COSTS

Item	Value
Construction	
Construction Cost	$9,670,000
Construction Contingency	$1,425,000
Subtotal Construction Cost	**$11,095,000**
Professional Services	
Planning Advance	$75,000
Funding Administration	$30,000
Environmental Review	$20,000
Anti-Degradation Review	$20,000
Financial Advisor	$30,000
Bond Attorney	$30,000
Surveying	$20,000
Engineering Design Services	$760,000
Engineering Bidding/Construction Services	$980,000
Startup Services	$30,000
Subtotal Professional Services	**$1,995,000**
Misc. Costs	
Property/Right-of-Way Purchase	$500,000
Utility Extensions (Electric, Gas, Etc.)	$300,000
Loan Origination Fee	$110,000
Subtotal Misc. Costs	**$910,000**
Total Estimated Cost	**$14,000,000**

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City of SALEM

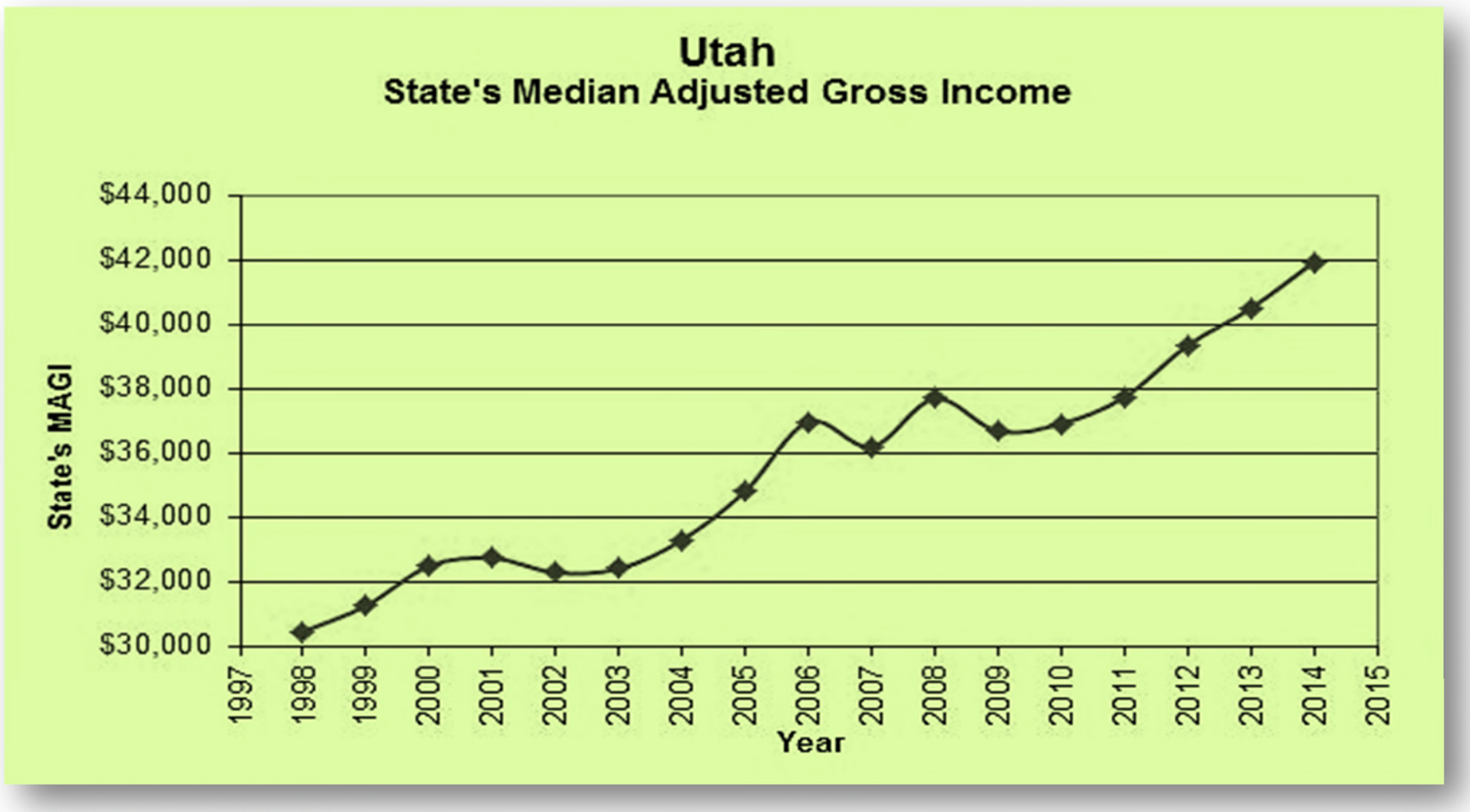
RECOMMENDED ALTERNATIVE

BIOLOGICAL NUTRIENT REMOVAL - OXIDATION DITCH SYSTEM

❖ FUNDING OPTIONS

➢ Division of Water Quality

- Grants will be difficult to obtain because Salem's Median Adjusted Gross Income ($54,213) is well above the State average ($41,923). The maximum affordable rate set by the State would be approximately $63 per month. All funds will be loan, at an interest rate of 1.5-2.5%.



Graph courtesy of Utah DEQ

➢ USDA Rural Development

- Eligible for USDA loans with 20 to 40 year at an interest rate of 2.875% for Salem. Salem is not eligible for grant funds due to the income level.

➢ Permanent Community Impact Board (CIB) Fund

- This funding will be difficult to obtain because CIB uses mineral royalty monies and Utah County has very little mineral extraction activities.

➢ Other Small Grant or Loan Funding Sources

- STAG / SAAP (EPA) Grant
- U.S. Army Corps of Engineers (595 Funding)
- Central Utah Water Conservancy District
- Bureau of Reclamation
- Utah Division of Water Resources
- Utah Governor's Office of Economic Development

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RECOMMENDED ALTERNATIVE

BIOLOGICAL NUTRIENT REMOVAL - OXIDATION DITCH SYSTEM

ESTIMATED USER RATE ANALYSIS

	DWQ Loan	USDA Loan
Rate Increase		
Project Cost	$14,000,000	$14,000,000
City Match	$1,000,000	$1,000,000
Loan Amount	$13,000,000	$13,000,000
Term (years)	20	40
Interest Rate	1.500%	2.875%
Annual Payment	$757,000	$551,000
Current ERUs (2015)	2,380	2,380
Low Projection Growth (ERUs)	500	500
Projected ERUs for Year 2020	2,818	2,818
Increase per ERU	$22.39	$16.29
Calculation of New Rate		
Salem Collection/Admin	$20.00	$20.00
Treatment	$12.00	$12.00
Debt Service	$22.39	$16.29
Estimated New Rate	**$54.39**	**$48.29**

USER RATE COMPARISON

City	Population	Base Monthly Rate	Usage Charge (per 1000 gal)	Avg. Monthly Rate
Salem (New WWTP)	**7,237**			**± $50.00**
Salem (Existing)	**7,237**	**$24.00**	**$0.50**	**$24.00**
Payson	19,331	$32.39	$1.09	**$40.57**
Spanish Fork	37,527	$16.59	$1.52	**$27.99**
Mapleton	9,071	$30.76	$0.00	**$30.76**
Santaquin	10,106	$37.44	$0.75	**$43.07**
Springville	31,464	$19.73	$1.32	**$29.63**
Mona	1,578	$52.00	$0.00	**$52.00**

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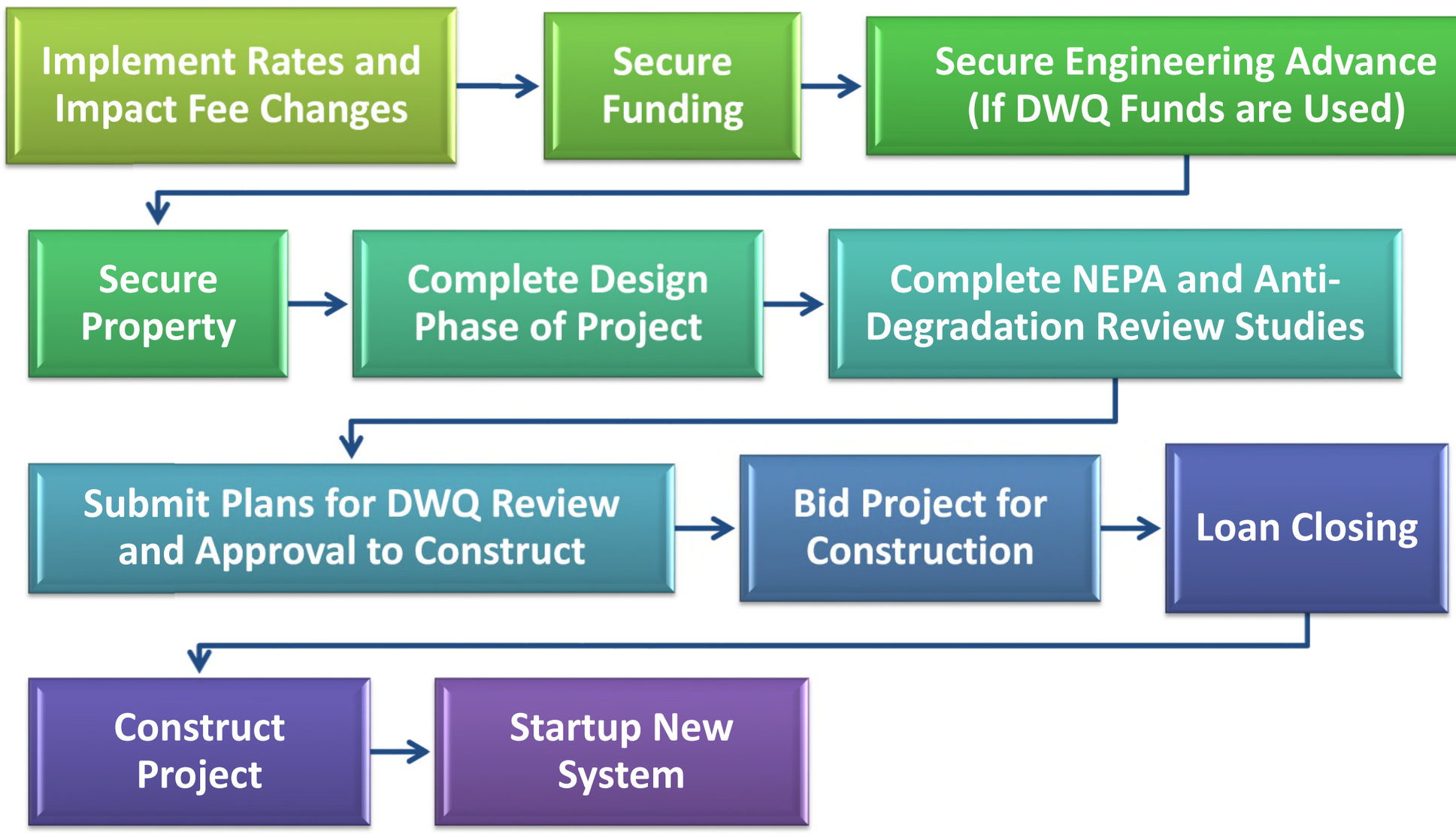
City of SALEM

RECOMMENDED ALTERNATIVE

BIOLOGICAL NUTRIENT REMOVAL - OXIDATION DITCH SYSTEM

IMPLEMENTATION SCHEDULE



PROJECT SCHEDULE

Item	Start	End	Duration (months)	2016				2017				2018				2019				2020				2021			
				1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Master Planning Work	1/1/2015	3/1/2016	14	●																							
DWQ Deadline-Submit Master Plan		8/1/2016				■																					
Procure Funding	3/1/2016	9/1/2016	6		●	●																					
Secure Design Advance	3/1/2016	9/1/2016	6		●	●																					
Conduct Public Outreach	3/1/2016	9/1/2016	6		●	●																					
Complete Anti-Degradation Review	7/1/2016	9/1/2016	2			●																					
Complete Detailed Design	9/1/2016	12/1/2017	15			●	●	●	●	●	●																
DWQ-Adopt 2013 Ammonia Criteria										■																	
DWQ Deadline-Submit Plans and Specs		2/1/2018										■															
Coordinate DWQ Review/Approval	12/1/2017	3/1/2018	3									●															
Conduct Bidding Phase	3/1/2018	6/1/2018	3										●														
Close Loan	6/1/2018	8/1/2018	2											●													
DWQ Deadline-Start Construction		2/1/2019														■											
Complete Construction	8/1/2018	8/1/2020	24												●	●	●	●	●	●	●	●					
DWQ-Phosphorus Rule Compliance		1/1/2020																		■							
DWQ Deadline-Complete Construction		8/1/2021																								■	
Renew Discharge Permit	3/1/2020																			●							
Assist with Startup and Operation	8/1/2020	8/1/2021	12																			●	●	●	●		

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